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ABSTRACTS VOLUME

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How to scan a whole mountain - a new method for the scientific assessment of dinosaur tracksites

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The largest dinosaurtracksite known today lies close to Sucre (Bolivia) in an active quarry. The Cal Orck'o area shows 5'500 footprints with six different morphotypes (El Molino Formation; Maastrichtian). The steeply inclined wall has an extension of over 1.5 km and maximal height of 120 m covering a surface of over 65'000 m^2. Since 1998 a long term research project of the Natural History Museum of Basel deals with different aspects of the site. Due to the gigantic dimension of the wall and the amount of the imprints we had to develop a new method for measuring and documenting the record of dinosaur footprints.

Prior to 2006 classical alpine climbing techniques, laser distometers and casting methods to get single data sets were used. However, we weren't able to get a complete data set of the whole site. Together with an Austrian Engineering Company we developed a new method for a complete measurement and accurate documentation of the site.

The goal was to achieve a high resolution orthofotographic picture of the wall. The 3D geometry of the whole mountain of Cal Orck'o was gathered by a complete laser scan in several slices form the quarry floor. The resulting point-cloud has an accuracy of about +/- 1 cm. Compiled with 200 topographic reference points measured (reflectors in the wall) with a classical theodolite we received an exact geometry of the whole surface. The wall is now defined by a point cloud with over 100 millions of points. Afterwards the main track bearing surface has been photgraphed by a special analog large format camera (UVMK 13x18) with 39 pictures. These pictures were digitized and merged to a single picture; the next step included a deskewing and merging with the obtained scanning data in order to get a high resolution orthophoto. All trackway and indididual parameter can now be measured on the screen with software such as ArcInfo, site maps are realized with Adobe Illustrator. This method allows processing of large surfaces with thousands of footprint, independent of weather or access conditions. The whole field work was done in 10 days with 4 people.

The High precision Laser Scanning and orthophotography of the whole quarry surface, the establishment of a Laser-DEM with rectified orthofotographs and georeferenced high-resolution maps allow virtual cartography of the footprints as well as conservation and stabilizing work in a single 3 D model. This formed the base for an application to protect Cal Orck'O as a World Heritage site.